*RESCUE OF EMPLOYEE FROM MANHOLE

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1. GENERAL

1.01 This practice describes emergency procedures to be followed in rescuing an employee from a manhole. Work at a manhole is to be performed in accordance with Bell System Practices. Work performed in this manner will provide for maximum safety for employees and will drastically reduce the possibility of injury.

1.02 Employees expected to work in a manhole shall be completely familiar with and follow the procedures set forth in Sections 620-140-501—Testing and Ventilating Manholes, 081-700-100 through 081-700-107—Testing and Use of Specific Gas Indicators, 081-700-120 or 081-700-122—Description and Use of the B or C Gas Test Kit, and 620-135-010 and 620-135-100—Work Area Protection.

1.03 ***Warning: A rescuer shall not enter a manhole unless it has been tested for the presence of combustible gas, purged, and continuously ventilated by using a power blower in the prescribed manner.*** Subsequent fatalities have occurred in the public utility industry when a rescuer went to the aid of a victim in a manhole before testing for the presence of a combustible gas or properly ventilating the manhole.

1.04 While testing for the presence of combustible gas, the rescuer must continuously observe the face of the meter from the first squeeze of the aspirator bulb. A high concentration of combustible gas could cause the meter pointer to rapidly move to a full scale deflection and then return to some point on the scale, or to zero or below, and could possibly burn out a filament. Unless the rescuer observes the extremely rapidly moving needle, subsequent bulb aspirations could lead the rescuer to the erroneous assumption that the atmosphere being tested is safe, when actually a very dangerous condition exists.

1.05 An employee could need to be rescued from a manhole for many different reasons: illness, rendered unconscious as a result of a physical blow, heart attack, asphyxiation or oxygen deficiency from an improperly ventilated manhole, etc.

1.06 In all cases where an employee must be rescued, another employee or nonemployee should be directed to call the appropriate emergency unit (rescue squad, fire department, police, etc). The person placing this call should be directed to dial the 911 emergency number (if in use) or 0 for emergency assistance. The specific location where the emergency assistance is required should be clearly identified. Rescue efforts shall proceed and appropriate first aid techniques applied until assistance arrives.

1.07 A rescuer going to the aid of an employee must determine the extent of assistance required by the victim and whether it is imperative that the employee be immediately removed from the manhole. Emergency first aid, if required, should be administered in the manhole. ***Whenever the life of the victim is not jeopardized by remaining in the manhole, leave the victim in the manhole until an appropriate emergency unit is available to lift the employee out of the manhole. First aid measures should continue to be administered in the manhole while awaiting the emergency assistance.***

1.08 When it is decided that the employee must be removed, rescue efforts shall proceed without delay as outlined in Parts 3 and 4.

1.09 In administering first aid to a victim, follow the techniques described in the American Red Cross First Aid textbook as taught in the Bell System first aid and personal safety course.

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1.10 This practice and the Red Cross First Aid textbook should be reviewed at intervals so that if an employee requires assistance, a rescue will be handled effectively. It is essential that each employee be prepared to cope with emergency situations and be able to provide lifesaving aid to a victim. A difference between life and death, in many cases, depends upon the knowledge, skill, and judgment exercised by the rescuer.

2. PLANNING THE RESCUE

Seeking Assistance

2.01 The employee who first observes that a fellow worker in a manhole is disabled or in need of assistance shall call out to other employees or a passerby for assistance. The aid of a nonemployee could be sought in this emergency situation. One rescuer shall act as a leader and direct the rescue operation as outlined in the following paragraphs.

Making Manhole Safe for Entry

2.02 ***The importance of evaluating the conditions at the manhole site cannot be overemphasized. Unless all precautions are followed, a rescuer attempting to assist an employee in a manhole could also become a casualty.***

2.03 A rescuer, finding an employee in an unconscious state, shall assume that the worker has been overcome by gas or lack of oxygen. The rescuer must determine if a power ventilator is operating properly, without any restriction in the airflow to the manhole. If a blower had not been in operation, continuous ventilation must be provided before proceeding.

2.04 With continuous ventilation in progress, the atmosphere of the manhole must be tested for combustible gas. The manhole can be entered only if the gas indicator reading is less than 10 percent of a full-scale range of the meter.

2.05 If an unsatisfactory gas concentration is found, the ventilator is to be checked for any restriction in the airflow, such as, obstruction at the air intake of the ventilator, any unnecessary bends in the ventilating hose, manhole tent restrictions, etc. Another sampling of the manhole atmosphere should be taken if a restriction in the airflow was detected and corrected. If the test indicates a safe atmosphere, rescue efforts can proceed.

2.06 Blowers with sufficient capacity for the volume of the manhole being ventilated will provide an exchange of air so that the atmosphere in the manhole affords a safe work environment. However, if the ventilator is operating properly, without any air restrictions, and after subsequent test an unsatisfactory atmosphere is still detected, the manhole should not be entered for a rescue attempt. Contact the appropriate company supervisor, the gas company, and the local emergency unit for assistance. If available, a second ventilator unit can be put to use in an attempt to clear the unsatisfactory atmosphere.

Equipment Needed

2.07 A rescue rope (1/2-inch minimum) in good condition should be used to lift the victim from the manhole. A hand line, aerial platform guy rope, or aerial hand line in good order can be used for this purpose.

2.08 If available, a job vehicle with a lifting mechanism (derrick, aerial lift) could be moved to the manhole and used to aid in removing the victim. See Part 4.

3. MANHOLE RESCUE—MANUAL

3.01 When it is decided that a victim is to be removed from a manhole, proceed in the following manner:

(1) Place a rescue rope around the victim, making one complete turn around the victim's body high up at the armpits, keeping the line high up under the armpits so it will not have to be raised later.

(2) Tie three half hitches at the back of the victim's head in line with the spine (see Fig. 1).

Note: If the aerial platform guy rope is used, make one complete turn around the victim's body and snap onto the pulling end or the line.

(3) Free the blower hose in the manhole so it can be pulled out from the grade level.

(4) Ascend the manhole ladder.

(5) Pull the ventilating hose out of the manhole.

(6) Remove the manhole shield.

(7) Pull the manhole ladder out of the manhole (if a portable ladder).

(8) The rescuers shall assume a position on opposite sides of the rescue rope at the grade level at the manhole opening (see Fig. 1).

3.02 Obviously, the effort required to rescue a person from a manhole by hand necessitates quite a sustained level of physical strength. To minimize the strain placed on the rescuers, they must coordinate their combined efforts very closely or else their work will be substantially dissipated and could result in further injury to the victim or themselves. An effective rescue will require that one of the participants in the rescue direct the overall effort and audibly signal the pulling cycle of the operation. Success will be achieved when the two rescuers coordinate their grip and maintain a continuous strain on the rope together.

3.03 The hands of the rescuers shall be positioned to form a locking hold on the rope. The rescuer on the right of the rope should have the right hand forward, while the rescuer on the left will have the left hand forward and between both hands of the rescuer on the opposite side of the rope.

3.04 The rescuers shall exert a steady pull on the rescue rope. This is accomplished by lifting and continuously changing the position of the hand furthest back on the rescue rope to the most forward position (see Fig. 2).

> ***Reminder:*** The total weight lifted by each rescuer is halved when this is accomplished. However, at any given moment, if one rescuer slacks off in an uncoordinated fashion, the other rescuer is burdened with the extra weight.

4. MANHOLE RESCUE—MECHANICAL

4.01 When an aerial lift device is available, follow the same procedures as outlined in 3.01 (1) through (7).

4.02 Position the aerial lift device over the hole. Fasten the rope previously attached to the victim to the lifting mechanism. As one rescuer operates the mechanical lifting device, the other rescuer will guide the victim safely through the manhole chimney.

Fig. 1—Rescuer's Position at the Manhole

(A) INITIAL GRIP POSITION ON RESCUE ROPE

(B) RESCUERS CHANGING HAND POSITIONS

(C) RESCUERS CHANGING HAND POSITIONS

NORMALLY, EMPLOYEES WORKING WITH A ROPE ARE REQUIRED TO WEAR GLOVES. HOWEVER, EXPERIENCE HAS SHOWN THAT FOR GRIPPING PURPOSES AND FOR EASE OF WRIST MOVEMENT IN TAKING UP RESCUE ROPE SLACK, THE USE OF GLOVES REDUCES THE EFFECTIVENESS OF THE OPERATION.

Fig. 2—Illustration of Position of Hands